CLAIMS

1. A system for combining spatial and linear (attribute) data in a single relational database, comprising:

a computing device having a user interface;

a relational database connected to the computing device and accessible by structured query language, the database comprising spatial and attribute data related to geographic information; and

means for providing dynamic segmentation of permanent anchor sections, an anchor section defining a spatial reference for a geographic element in the relational database.

2. A system as recited in claim 1, wherein the relational database is accessed via an object-oriented front-end.

3. A system as recited in claim 1, wherein the relational database further comprises:

integrated temporal data for maintaining historical records.

4. The system as recited in claim 1, wherein the relational database is also accessible by a graphical information system viewing application.

5. A system as recited in claim 1, further comprising means for performing automated database maintenance, making the multiple databases of road network data consistent with one another.

6. A system as recited in claim 1, further comprising:

at least one additional computing device connected to the relational database, wherein the relational database is stored in a distributed data environment.

7. A method for combining spatial and linear (attribute) data in a single relational database, comprising:

providing permanent anchor sections representing physical sections of a roadway, an anchor section defining a spatial reference in road data, the anchor sections also integrated with linear data to form a road network;

associating attributes and linear events with positions in the road network;

storing linear event data related to anchor sections in a relational table;

storing road attribute data by associating each attribute with locations specified in terms of a linear referencing method (LRM);

implementing a dynamic segmentation function for conducting dynamic segmentation on a selective basis;

maintaining historical data related to anchor sections and linear event data;

enabling the creation of an interior intersection within the road data, where an interior intersection to an anchor section is defined by offsets from an end of the anchor section;

synchronizing spatial and linear data, for tying spatial data to a physical location represented by the road network; and

utilizing meta-data definitions for database elements in a data dictionary, the data dictionary defining an implementation of the relational database, resulting in an extensible relational database model.

8. A method as recited in claim 7, further comprising:

dynamically segmenting permanent anchor sections by adding interior intersections using offset information.

9. A method as recited in claim 7, wherein the database model uses an open architecture.

10. A method as recited in claim 7, wherein linear event data is stored by storing each value anchored linear event combination in a separate table record.

11. A method as recited in claim 7, wherein linear event data is stored by storing each value anchored linear event combination in a different table record with the same anchored linear events used for all event data, resulting in dynamic segmentation.

12. A method as recited in claim 7, wherein the linear event data comprises an event value; and an anchored linear event related to at least one anchor section, the anchored linear event identifying start and end offsets of an anchor section.

13. A method as recited in 12, wherein jurisdictional areas are maintained as spatial data, the method further comprising:

storing jurisdictional area polygons in the database;

accessing event data for a jurisdictional area using a spatial query;

identifying anchor sections contained within a specified jurisdictional area; and

compiling event data for the identified anchor sections using a relational query.

14. A method as recited in claim 13, further comprising:

summarizing anchor section event data using a summary query.

15. A method as recited in claim 13, further comprising:

summarizing anchor section event data using a report query.

16. A method as recited in claim 13, further comprising:

pre-processing spatial queries for desired jurisdictional areas; and

storing results of the pre-processed spatial queries for desired jurisdictional areas in a location accessible by a query program, resulting in more efficient access to event tables stored by the pre-processing queries.

17. A method as recited in claim 7, further comprising:

importing road network data in the form of a link-node network by adding additional table columns required to maintain consistency of the link node network with a spatial data engine for the road network data, the adding further comprising:

creating an entry in an anchor section table for each link in the imported road network link table;

assigning an anchor section identifier (ID) to the entry;

copying associated spatial data from the imported data into the spatial data engine road network data; and

copying other data associated with the link to define the road network.

18. A method as recited in claim 7, further comprising:

presenting data as tabular query results and reports.

19. A method as recited in claim 7, further comprising:

using standard geographic information system (GIS) tools to produce maps using data in the road network.

20. A method as recited in claim 7, further comprising:

locking data for a desired periods of time while new data is collected.

21. A method as recited in claim 7, further comprising:

querying data in the road network by a combination of spatial and linear attributes.

22. A method as recited in claim 21, wherein the querying further comprises:

using one of a spatial query based on a temporary area defined via a map interface or a relational query based on jurisdictional areas; and

filtering results of the query based on event data associated with anchor sections in an area of interest as defined by the query.

23. A method as recited in claim 21, further comprising:

summarizing event values for the associated anchor sections.

24. A method as recited in claim 21, further comprising:

mapping the associated anchor sections.

25. A method as recited in claim 21, wherein the querying launches at least one distributed application to retrieve data from a distributed network of databases.

26. A method as recited in claim 21, further comprising:

presenting results of the querying in a simple tabular display.

27. A method as recited in claim 7, further comprising:

converting location reference data stored by a traditional linear referencing method to an anchor linear referencing method as a collection of anchor sections and intersections that represent the roadways, the converted data for use with the road network comprised of anchor sections integrated with linear data.

28. A transportation information system, comprising:

at least one computing device having storage for data and computer code and capable of executing object oriented computer code;

a current data repository for storing current transportation network data and linear event data;

an historical data repository for storing historical transportation network data and linear event data;

a current data query program comprising computer code for querying the current data repository;

an historical data query program comprising computer code for querying the historical data repository;

a report generator comprising computer code for generating reports using data retrieved during a querying of a data repository;

a maintenance process comprising computer code for maintaining data in the historical data repository;

an anchor linear referencing system (LRS), the LRS having a collection of anchor sections, intersections, and anchored linear events, an anchor section being a defined data set representative of a linear portion of a transportation pathway, the anchored linear events comprising a set of properties and attributes further defining their qualities and relationships to elements in the transportation network, wherein the data defined by the LRM comprises the network of transportation pathways, and wherein intersections may be interior to an anchor section and defined by an offset from an end of an anchor section.

29. A system as recited in claim 28, wherein at least one anchor section connects two adjacent intersections.

30. A system as recited in claim 28, further comprising an optimized repository for query data, the optimized repository being generated by the maintenance process.

31. A system as recited in claim 28, wherein the computer code is object-oriented.

32. A system as recited in claim 28, wherein attributes and properties are associated with elements in the network and disjointed attributes of an anchor section are enabled.

33. A system as recited in claim 28, where the transportation network is a road network.

34. A system as recited in claim 28, where the transportation network is for waterway shipping lanes.